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Information technology capabilities and their role in enhancing sustainable development - an analytical study of a sample of job cadres at the Northern Technical University, Nineveh site

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A B S T R A C T

The current study aims to reveal the role of information technology capabilities in promoting sustainable development at the Northern Technical University. To achieve this goal, a hypothetical plan was built based on the two main variables of the study. The first works with the independent variable of information technology capabilities with its dimensions represented by (infrastructure, human resources, information technology management, and the second variable represented by the dependent variable of sustainable development, which was measured by the dimensions represented by the economic dimension, the social dimension, and the tele dimension). The study adopted the descriptive analytical approach in presenting the intellectual frameworks, choosing the study tool and its sample, processing and analyzing the data, and then interpreting it. The study problem was represented by the following main question: Do information technology capabilities play a role in promoting integrated development in the organization being studied? The study community was identified at the second northern university, Nineveh site, and a random sample of (140) individuals was selected. through the use of statistical packages represented by - 26.SPSS V), for the study to reach a set of conclusions, the most important of which is matching the study model with the hypothetical model, and the results of the correlation analysis showed the existence of a positive and statistically significant correlation between information technology capabilities and sustainable development at the general level in the university under study.

1.Introduction

Organizations seeking to promote sustainable development should work to enhance economic sustainability by investing in innovation and technology, improving resource efficiency and reducing waste, in addition to enhancing environmental sustainability by recycling and adopting environmentally friendly practices. This is what we see at the Northern Technical University as a green and environmentally friendly university. Social sustainability should also be enhanced by providing a safe and healthy work environment for its members.

In addition, the increasing use of information technology capabilities has had a significant impact on all the activities and functions of organizations, which requires organizations to keep up with these developments by preparing advanced technological devices and equipment and using them effectively to transform from traditional methods and means used in providing services to modern patterns and methods, which contributes to the creativity of many services by generating new ideas. Organizations have been quick to adapt to these developments in order to benefit from the opportunities provided by the information and communications revolution.

In order to achieve the objectives of the current study and provide an adequate idea about it, as well as covering its contents theoretically and in the field, the current study consisted of four chapters. The first chapter discussed previous studies in the field, while the second chapter included the study

1.Previous studies

Study of Awalmeh, (2021):

"The relationship between information technology capabilities, organizational intelligence, and competitive advantage."

Objectives of the Study:

To clarify whether IT capability enhances or hinders organizational intelligence, to show whether IT capability enhances or hinders marketing opportunity exploration, and to establish whether IT capability enhances or hinders threat neutralization.

Study community and sample:

The study community represents e-commerce organizations, and the study sample included (224) employees from different positions in e-commerce organizations.

Study Result This study identified that IT capabilities enhance organizational intelligence and each has a positive impact on competitive advantage. The introduction of the mediating variable resolved the weak relationship between IT business capabilities and market opportunity exploitation. The mediating variable also contributed to improving the degree of influence between IT capabilities on competitive advantage strategies.

Study by Al- Alsaqr and Al- Alrabie,2024:

"The Role of Institutional Transformation in Achieving Sustainable Development at Prince Sattam Bin Abdulaziz University in Al-Kharj"

Objectives of the Study:

To identify the reality of institutional transformation in achieving sustainable development at Prince Sattam bin Abdulaziz University, and to reveal the extent of Prince Sattam bin Abdulaziz University's contribution to achieving sustainable development.

The study community and its sample represent the study community of administrative leaders at Sattam bin Abdulaziz University in the Kingdom of Saudi Arabia, and the research sample consists of 84 administrative leaders at the university.

Study Findings:

Motivating university employees to develop their academic level in support of institutional transformation, adopting advanced technical systems in management and education to raise performance efficiency.

1 Methodology

1.1 Research Problem

The work path in universities presents many problems and challenges in a way that places universities before the reality of activating their developmental role and keeping pace with technological and technical developments through their possession of advanced infrastructure as well as attracting distinguished human resources. Since sustainable development is one of the most prominent of these challenges that require universities to focus through the economic, environmental and social dimensions in order to identify the causes of this problem and then work to reach the necessary treatments for it.
Does IT capabilities play a role in promoting sustainable development in the at the Northern Technical University?

In light of this, the research questions of the study can be identified as follows:

1. Is there a significant correlation between information technology capabilities and sustainable development in terms of their dimensions at the macro and micro levels in the university under study?
2. Is there a significant impact of information technology capabilities on sustainable development, in terms of their dimensions at the macro and micro levels in the university under study?

1.2 Importance of the Research

The importance of the study comes from the importance of the variables it addressed, as it studies the capabilities of information technology represented by its dimensions (infrastructure, human resources, information technology management), and the dimensions of sustainable development through its tangible dimensions, (The economic dimension, the social dimension, the environmental dimension). Hence, the importance of the study emerges in the following aspects:
Theoretical aspect

This aspect is achieved by the study providing a theoretical framework for the capabilities of information technology and sustainable development, as it represents a noteworthy addition to

both concepts, and the study is an intellectual contribution that can be used as a guide in application.

Practical aspect

The importance of the study in the practical aspect lies in the following:

1. Determine the role of information technology capabilities in determining sustainable development in the field under study.
2. Determine which dimensions of sustainable development are most important for the university under study.

1.3 Research Objectives

In light of the problem and its questions, this study seeks to achieve a number of objectives that are essentially related to revealing the capabilities of information technology and its role in promoting sustainable development. The specific objectives are:

1. Revealing the nature of the impact and the relationships between information technology capabilities and sustainable development.
2. Reaching some conclusions related to the study variables, information technology capabilities and sustainable development in the university under study, in addition to presenting many proposals that help improve the reality of work in universities in general and the university under study in particular in relation to the study variables and their dimensions.

1.4 Hypothetical study plan:

The hypothetical plan reflects the nature of the relationship between the study variables, in addition to clarifying the dimensions of those variables, their relationship, and their impact represented by the dimensions of information technology capabilities (infrastructure, human resources, information technology management), and the dimensions of sustainable development: the economic dimension, the social dimension, and the environmental dimension, as shown in Figure (1):

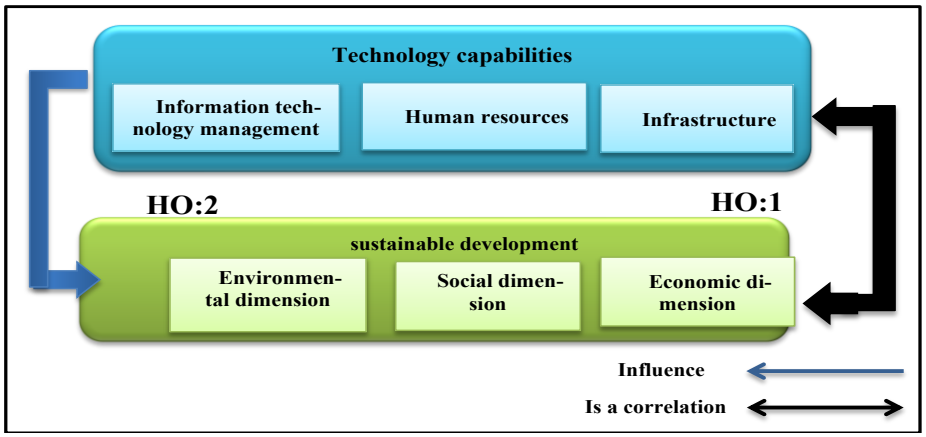

Fig. 1. Shows the hypothetical of the study

2.5 Study Hypotheses

In anticipation of answering the main research question and its sub-questions, and in order to achieve the primary objectives of the study, the hypotheses were formulated based on the proposed conceptual framework. These hypotheses represent an initial assumption that the researcher adheres to temporarily. The main and sub-hypotheses are stated in the null form, given the lack of prior research confirming a relationship between the variables being studied (as per the researcher's knowledge). The hypotheses are as follows:

1. First Main Hypothesis:

H_o:1 – There is no significant correlation between information technology capabilities and sustainable development at a statistical significance level (0.05) from the point of view of job cadres in The researched field.

2. Second Main Hypothesis:

H_o:2 – There is no statistically significant effect of information technology capabilities in sustainable development at a statistical significance level of (0.05) from the point of view of job cadres in the researched field.

2 Concepts of IT Capabilities and Sustainable

2.1 IT Capabilities Concepts

Information technology has changed human life throughout history and created opportunities and challenges. The technological development that the world is witnessing is still ongoing and the effects of technological discoveries have become clear on the ground little by little, in addition to the orientation of organizations towards technological development as a result of their use of information technology in recent decades and their possession of high capabilities that enabled them to synchronize these developments [1].As for the definition of information technology capabilities, [2].The ability to employ the digital information network to create and control transactions within the organization and implement them, in addition to the ability to control costs associated with information technology and deliver the required systems and activate the organization's goals through the application of this technology," and he stated that it is the role of information technology resources in shaping the competitive advantage [3]of universities, with their ability to control costs associated with technology and achieve business goals by applying information technology.

2.2 Dimensions of IT Capabilities

1. Infrastructure:

"It includes information technology-related materials such as networks, software, and hardware created by systems that serve as a technical basis for product implementation based on the ability of information technology and process innovation" [4].The IT infrastructure was explained as the university's ability to invest information technology resources using multiple applications to access accurate, reliable, and secure information in a timely manner, maintain its privacy, and deliver it to the main user, whether the manager, employee, supplier, or customer." [5].

2. Human resources

The human resources of information technology increase the capacity of the university's high-value organizational system. The university's possession of human resources with a high level of skills and experience in working in the field of information technology gives it the ability to confront and solve the problems it faces, in addition to the ability of these human resources to exploit the opportunities of high value for the university [6] .The capacity of human

resources of information technology is represented by the professional ability of information technology employees (such as skills or)[7]. Basic knowledge to perform the assigned tasks.

“The researchers believe that information technology capability refers to the skills, knowledge and ability to use information technology effectively to achieve goals, in order to adapt to rapid developments in technology and to constantly update knowledge.”

3. Information Technology Management

"IT management depends on the size and type of the university and its interests in general, so monitoring and supervising the services provided by the university has become necessary to maintain the quality of the service provided by the university, and here is what justifies that the requirements of the university's IT capabilities should be in the field of providing services [8].The IT manager plays an important role in implementing and managing information technology, as he works to plan, coordinate and direct activities related to computers in the university, and cooperates with other managers in setting the university's goals and implements the technology that contributes to achieving these goals" [9].

2.3 The Concept of sustainable development

The concept of sustainable development began to gain wide acceptance in the late 1980s after it appeared in the report “Our Common Future”, also known as the Brundtland Report. The World Commission on Environment and Development, as it was officially called, sought to draw the world’s attention to “the accelerating deterioration of the human environment and natural resources and the consequences of this deterioration for economic and social development.” [10].It was also defined as “development that moves society into an era of clean industries and technologies that use the least amount of energy and resources, and produce the minimum amount of gases and pollutants that lead to raising the temperature of the Earth’s surface” [11].

The researchers believe that sustainable development is a development approach that aims to meet current needs without harming future needs.

2.4 Dimensions of sustainable development

1. The economic dimension:

The economic dimension in sustainable development is based on the principle of increasing the welfare of society and eliminating poverty through the optimal and efficient exploitation of natural resources, i.e. achieving economic growth and fair distribution of wealth and emphasizing the principle of human needs, taking into account the limits set by nature to preserve its resources and escape the destruction of waste to ensure the continuity of the giving of natural resources in the present and the future” [12]. while [13] Stated that the economic dimension is “increasing its share of necessary goods and services in light of limited resources, and this is achieved by raising the level of efficiency and effectiveness, providing the necessary production elements, and raising growth rates in various fields of production

2. The social dimension:

“This dimension includes human races, individual and collective relationships, and the cooperative efforts they make, and the problems they cause or the needs they raise [14]. [15] Stated that it is “increasing the ability of individuals to exploit available energy to the maximum extent possible to achieve freedom and well-being.” The social dimension is considered the dimension that distinguishes sustainable development, because it represents the human dimension in the narrow sense, which makes growth a means of social cohesion”.

3. the inter-dimensional dimension:

“It is a sustainable system that preserves fixed assets of natural resources, and avoids waste in both the use of resources and the depletion of renewable and non-renewable energy,” [16]. [17]. Stated that the inter-dimensional

dimension means “adapting to living within the carrying capacity of the ecosystem, and maintaining its ability to meet current and future needs, and this happens by making decisions that preserve the environment and help it support”.

3 The practical Aspect

3.1 Description of Study Samples

A sample of job cadres at the Northern Technical University in Nineveh Governorate was selected for this study. Electronic questionnaires were distributed to the sample, and 140 samples were collected. The demographic characteristics of the respondents were presented in the following distribution:

3.1.1 Distribution of Respondents by Age Group

The data in Table 1 reveal that the largest percentage of respondents (39%) are in the age group of than 30-40 years (54 respondents). This is the highest percentage among all age groups. The next largest group consists of individuals aged 40 to less than 50 years, who account for 31% of the sample (44 respondents). Those in the age group 40 years and over represent 22% of the sample (31 respondents).

Those in the age group than 20-30 years represent 8% of the sample (11 respondents). The smallest percentage is found in the under 20 years group, which represents only 2% (2 respondents). This distribution indicates that older employees with more experience and specialization are the most influential group in the study.

3.1.2 Distribution of Respondents by Gender

The data in Table 1 indicate that 69% of the respondents are male, while 31% are female. This suggests a significant gender imbalance, with males outnumbering females in the sample. This discrepancy may reflect the universitys tendency to invest more in the capabilities and energies of male employees, as opposed to female employees, who may have fewer opportunities for participation in activities and events within the university.

3.1.3 Distribution of Respondents by Educational Attainment

As shown in Table 1, The data shows that the largest group of respondents hold a master’s degree, with 31% of the sample, numbering 44 respondents, holding a diploma, 23% holding a bachelor’s degree, 11% holding a doctorate, 4% holding a higher diploma, and finally 2% holding a middle school certificate.

3.1.4 Distribution of Respondents by Years of Experience

In Table 1, the data show that the largest group of respondents (35%) have 11 to 15 years of experience. This indicates that employees with significant experience and expertise are the most represented group. The second largest group (22%) has 1 to less than 5 years of experience. The third group consists of individuals with 16 to less than 20 years of experience, comprising 21% of the sample. The smallest group, with 6 to less than 10 years of experience, accounts for 12% of respondents. This distribution highlights the importance of experience in the company, particularly among those with 11 to 15 years of service.

Table 1. Frequencies and percentages of individuals surveyed

T	General data	Categories	Number	%
1	Gender	Male	96	69
		Female	44	31
2	Age group	Less than 20 years	2	2
		than 20-30 years	11	8
		than 30-40 years	54	39
		than 40-50 years	44	31
		50 years and over	31	22
3	Academic achievement	Preparatory school	3	2.1
		Diploma	41	29.3
		Bachelor's	32	22.9
		high diploma	5	3.6
		Master's	44	31.4
		PhD	15	10.7
4	Experience	1 to 5 years	30	21.4
		6 to 10 years	17	12.1
		11to 15 years	35	25
		16 to 20 years	30	21.4
		20 years and over	28	20

Source: Prepared by the researcher based on the outputs of the program (SPSS v.23) n=1140

The results of the table above extracted from the SPSS statistical program indicate that the percentage of males is 69% and the percentage of females is 31%. As for age, it is clear that the highest age group is between 20-50 years old, where their percentage reached 80%, indicating that the majority of university members are new energies and youth. The percentage of holders of higher degrees reached approximately 50%, indicating that the university possesses the required competencies and specializations. As for experience, the results showed that the university possesses the expertise that plays a role in awareness, efficient use of resources, work on innovation and development, and achieving sustainable development goals.

3.2 Correlation Analysis

The correlation coefficient is used to assess the direction, strength, and nature of the relationship between two variables. The direction of the relationship (whether it is direct or inverse) is indicated by the sign of the correlation coefficient. The strength of the relationship is determined by how close the correlation

coefficient is to 1 or -1; the closer the value is to 1, the stronger the relationship. Lastly, the nature or significance of the relationship is assessed by the p-value accompanying the correlation coefficient. According to standard practice, a p-value less than 0.05 indicates that the relationship between the two variables is statistically significant.

First Main Hypothesis:

H0: There is no significant correlation between information technology capabilities and sustainable development at a statistical significance level ($\alpha \geq 0.05$).

The results presented in Table 2 and Figure 2 show a positive correlation between information technology capabilities and sustainable development,with a correlation coefficient value of 0.745. This indicates a strong positive relationship between the two variables. The relationship is also statistically significant, as evidenced by the p-value of 0.000, which is less than the threshold of 0.05. Based on these results, we reject the null hypothesis (H0) and accept the alternative hypothesis, which suggests that there is a significant positive correlation between information technology capabilities and sustainable development, with a significance level of ($\alpha < 0.05$).

Table 2. The relationship between information technology capabilities and sustainable development

Probability value P-value	Correlation value	Dependent variable	Direction of the relationship	Independent variable
0.000	0.745	sustainable development	<-->	IT capabilities

Source: Prepared by the researcher based on the outputs of the program (23.SPSS V)n=140

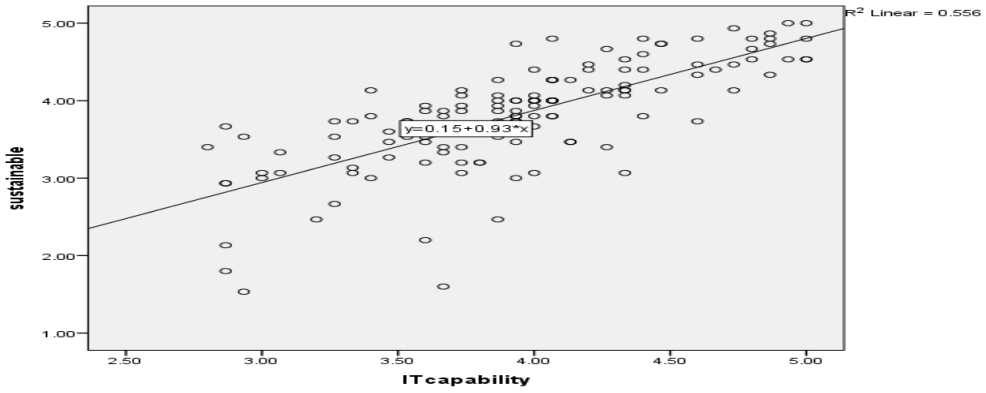

Fig. 2. The relationship between information technology capabilities and sustainable development

Source: Prepared by the researcher based on the outputs of the program (23.SPSS V). n=140

3.3 Analysis of influence relationships

This section examines the impact of each independent variable on the dependent variable, specifically testing the effect of information technology capabilities on Sustainable interactive marketing.

Second Main Hypothesis:

H0: There is no significant effect of information technology capabilities on sustainable development

at a statistical significance level ($\alpha > 0.05$).

The results presented in Table 3 indicate the following:

1. Direct Effect of Information Technology Capabilities on sustainable development: The regression estimate for the effect of information technology capabilities on sustainable development is 0.930, suggesting a positive and significant impact. This effect is statistically significant, as indicated by the p-value of 0.000, which is less than the significance level of 0.05. Additionally, the critical value (C.R.) is 172.5, which is greater than the table value (1.96), further confirming the significance of the relationship.

Based on these results, we reject the null hypothesis (H0) and accept the alternative hypothesis, indicating that information technology capabilities have a significant positive effect on sustainable development, with a significance level of($\alpha < 0.05$).

2. Effect Size: The effect size is calculated as 0.55, meaning that information technology capabilities explain 55% of the variance in sustainable development

The remaining 45% of the variance is attributed to other factors not included in the regression model, as determined by the boundaries set by the researcher. According to Jacob Cohen (1988), an effect size of 0.55 is considered large, suggesting that the influence of information technology capabilities on sustainable development

Table 3. Results of the impact of information technology capabilities on sustainable development

P-value	Value Critical C.R.	Effect size E.S	Standard Error Regression Coefficient Se.(β)	Regression coefficient Estimate(β)	Dependent variable	Reporting direction	Independent variable
0.000	172.5	0.55	0.930	0.759	sustainable development	←	IT capabilities

Table value= (1.96) t_{Tab}

Source: Prepared by the researcher based on the outputs of the program (23. SPSS V) n=140

4 Conclusions

The conclusions provide an intellectual summary of the study, highlighting the objectives for which it was conducted and the results it has achieved. The key findings are as follows:

1. The results of the correlation analysis showed a positive and significant correlation between IT capabilities and sustainable development at the aggregate level in the university under study, which confirms that the increased use of IT capabilities used by the university will be met with a noticeable improvement in the levels of promoting sustainable development in the university.
2. The results of the analysis of the impact relationships showed the existence of a positive and significant impact relationship between information technology capabilities on sustainable development at the overall level in the university under study, which confirms that the increase in the levels of availability of information technology capabilities dimensions in the university under study will be met with an increase in the sustainable development of the university under study.

5 Proposals

1. With the availability of the dimensions of information technology capabilities in the university under study, the necessity of strengthening those dimensions and realizing their importance from a practical perspective emerges, as follows: Taking the initiative to employ the physical appearance of the university, represented by physical facilities, equipment, communication materials and channels, to convey the positive image it enjoys.

Developing an electronic system to record and follow up on employee requests and complaints, allowing them to follow up on the status of their requests and obtain regular updates.

The necessity of applying sustainable development standards so that they are clear and specific to both academic and administrative aspects.

2. With the availability of sustainable development dimensions in the university understudy, the necessity of strengthening those dimensions and realizing their importance from an environmental perspective also emerges, as follows:

Providing additional benefits to the services provided by the university to employees is a measure that reflects the university's ability to meet employees' expectations and provide them with a satisfactory experience, to ensure the provision of sustainable development.

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